

Claims

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1. Medical device for acquiring measured data, in particular for monitoring body functions, consisting of at least one electrode attached to a patient in connection with at least one evaluator station, whereby the electrode has a covering and at least one sensor for detecting an electric, physical, chemical or biological quantity and its conversion into an electric quantity, and provision is made within the covering for at least one converter converting the electric quantity generated by the sensor into a digital value, whereby the converter is actively connected to at least one transmitting unit, for which provision is made within the covering for the wireless digital data transmission, and the evaluator station has at least one receiving unit for receiving the data transmitted by the electrode, characterized in that the evaluator station (1) has at least one transmitting unit (6) for the wireless digital data transmission, and the electrode (2a, ..., 2f) within the covering (71) has at least one receiving unit (30) for receiving the data transmitted by the evaluator station (1), whereby the data transmitted by the evaluator station (1) control at least the data transmission of the electrode (2a, ..., 2f) and/or manipulate the data transmitted by the electrode.

2. Device according to claim 1, characterized in that the evaluator station (1) contains one or a plurality of decoding unit(s) (19) and that at least one electrode (2) is equipped with at least one encoding unit (45).

3. Device according to claim 1or 2, characterized in that the evaluator station (1) contains one or a plurality of encoding unit(s) (22) and that at least one electrode (2) is equipped with at least one decoding unit (62).

4. Device according to one or several of claims 1 to 3, characterized in that the evaluator station (1) comprises at least one demultiplexer unit (20), and that at least one electrode (2) is equipped with at least one multiplexer unit (44).

5. Device according to one or several of claims 1 to 4, characterized in that the evaluator station (1) contains at least one multiplexer (21), and that at least one electrode (2) contains at least one demultiplexer (62).

6. Device according to one or several of claims 1 to 5, characterized in that the evaluator station (1) has at least one storage unit (8c) and/or at least one display unit (8a) and/or one or a plurality of alarm unit(s) (10).

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7. Device according to one or several of claims 1 to 6, characterized in that the evaluator station (1) and/or at least one electrode (2) has at least one electromagnetic detector (97) and/or emitter (98), the latter being designed as a semiconductor diode.

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8. Device according to one or several of claims 1 to 7, characterized in that the transmission control unit (7a) of the evaluator station (1) contains a synchronization unit, and that the synchronization unit synchronizes the reference frequencies, oscillator frequencies, carrier frequencies, the cycle, the phase and/or the time frame of at least one electrode (2).

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9. Device according to one or several of claims 1 to 8, characterized in that the evaluator station (1) and/or at least one electrode (2) comprise(s) a transmission control unit (7a, 34).

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10. Device according to one or several of claims 1 to 9, characterized in that the evaluator station (1) contains a status unit (7c), the latter permitting the selection of the electrode (2) to be addressed and/or automatically recognizing which electrode(s) is/are connected and/or correctly connected to the body at the start of the diagnosis or monitoring.

Conc

11. Device according to one or several of claims 1 to 10,
characterized in that the evaluator station (1) and/or at least
one electrode (2) contain(s) an error diagnosis and/or
correction unit (7d).

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12. Device according to one or several of claims 1 to 11,
characterized in that the evaluator station (1) contains a
control unit (4b), the latter always adjusting the transmitting
power of the signals of the electrode (2) and/or the evaluator
station (1) to the minimum value required for still operating
the circuit and/or transmitter (31) of the electrode (2); and
that, if need be, if the transmitting power required by the
electrode (2) and/or the evaluator station (1) is too high,
the respective electrode no longer transmits signals to the
evaluator station (1) and/or receives signals transmitted
by the evaluator station (1).

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13. Device according to one or several of claims 1 to 12,
characterized in that the evaluator station (1) and/or
at least one electrode (2) contain(s) a calibration unit (7c).

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14. Device according to one or several of claims 1 to 13,
characterized in that the evaluator station (1) has an
interleaving unit (24) and/or a deleaving unit (18); and that
at least one electrode (2) has a deleaving (61) and/or an
interleaving unit (47).

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15. Device according to one or several of claims 1 to 14,
characterized in that at least one electrode (2) is attached
to the skin surface (96).

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16. Device according to one or several of claims 1 to 15,
characterized in that at least one electrode (2) has at least
one electrode pin (76) penetrating the body of the patient.

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17. Device according to one or several of claims 1 to 16,
characterized in that an evaluator unit (74) and/or a storage
unit (33a) is/are arranged in at least one electrode (2).

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18. Device according to one or several of claims 1 to 17,
characterized in that a sensor control unit (33) is arranged in
at least one electrode (2).

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19. Device according to one or several of claims 1 to 18,
characterized in that a training sequence unit (23, 46) for
generating a test code is present in at least one electrode (2),
and an equalizer (16, 59) is present in the evaluator station
(1), or reversely.

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20. Device according to one or several of claims 1 to 19,
characterized in that the electrode (2) is at least partly
supplied with energy by a high-frequency field emitted by the

evaluator station (1), and/or that at least one electrode (2) contains one or a plurality of accumulators (38) and/or at least one battery.

21. Device according to one or several of claims 1 to 20, characterized in that the electrode (2) has at least one antenna (36a), the latter being at least partly arranged in the electrode covering (71).

22. Device according to claim 21, characterized in that a reflector (36b) is arranged between the antenna (36a) and the side of the electrode covering (71) facing the skin.

23. Device according to one or several of claims 1 to 22, characterized in that at least one electrode (2) contains an identification unit (45a) for transmitting an identification code.

24. Device according to one or several of claims 1 to 23, characterized in that a reference element is arranged in the electrodes (2), said element serving for the determination of the own transmitting and/or high-frequency output(s).

25. Device according to one or several of claims 1 to 24, characterized in that the electrode (2) for error detection

contains one or a plurality of control sensor(s).

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26. Device according to one or several of claims 1 to 25, characterized in that the individual electronic components of the electrode (2) are integrated in one single semiconductor chip (electrode chip) (76).

27. Device according to claim 26, characterized in that the transmitting and/or receiving antenna (36a) of the electrodes (2) is/are arranged in the electrode chip.

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28. Device according to one or several of claims 1 to 27, characterized in that at least one sensor (40a, ..., 40i) of one electrode (2) is based on the field effect, bipolar transistor, diode, capacitor or AOW principle.

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29. Device according to one or several of claims 1 to 28, characterized in that the electrodes (2) contain ion-sensitive, gas, acceleration, pressure, potential, impedance, current, magnetic field, temperature, position and/or radiation sensors (40a, ..., 40i).

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30. Device according to one or several of claims 1 to 29, characterized in that two or a plurality of electrode pins (76) or tap-off points for measuring the bio-potentials (potentials, currents) are integrated in at least one electrode (2).

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31. Device according to one or several of claims 1 to 30, for measuring the O_2 -content and/or the CO_2 -content in the blood, characterized in that the electrode (2) contains at least one light- or IR-light-emitting diode (85) radiating into tissue with blood circulation, as well as comprises one or a plurality of radiation-sensitive detector(s) (86) detecting the radiation transmitted and/or reflected by the blood.

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32. Device according to one or several of claims 1 to 31, characterized in that the electrode (2) contains one or a plurality of impedance sensor(s) and/or at least one ISFET for measuring the moisture.

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33. Device according to one or several of claims 1 to 32, for controlling the breathing, characterized in that at least two electrodes (2) are equipped with one or a plurality of acceleration sensor(s) and/or spacing sensors, whereby at least one electrode (2b) is arranged in the abdominal region and one or a plurality of electrode(s) (2a, 2c ... 2i) is/are arranged outside of the abdominal region, said electrode(s) serving as reference electrode(s).

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34. Device according to one or several of claims 1 to 33, for controlling the breathing, characterized in that at least one electrode (2) contains one or a plurality of temperature

and/or gas and/or air humidity sensor(s), and that the electrode (2d) is attached near the nose and/or the mouth.

35. Device according to one or several of claims 1 to 34 for controlling the breathing, characterized in that at least one electrode (2d) contains one or a plurality of miniaturized microphone(s), and that the electrode (2d) records the respiratory noise and is arranged near the larynx or the bronchial tube.

36. Device according to one or several of claims 1 to 35, for measuring the temperature, characterized in that the electrodes (2) contain thin-layer and/or thick-layer resistors and/or cold conductors and/or hot conductors and/or diodes and/or bipolar transistors and/or thermistors.

37. Device according to one or several of claims 1 to 36 for measuring the position, characterized in that at least one electrode (2) contains magnetic field sensors and/or inclination sensors and/or micromechanical sensors.

38. Method according to claim 37, characterized in that the data transfer between the evaluator station and the electrode(s) takes place in the simplex or half-doublex or full-doublex operation.

39. Method according to claim 37 or 38, characterized in that the data transfer takes place according to the ASK-and/or PSK- and/or FSK-method(s).

40. Method according to claim 37 or 38, characterized in that the data transfer takes place according to the PCM-and/or the DM-method(s).

41. Method according to one or several of claims 37 to 40, characterized in that the high-frequency transmission for the data transmission and/or the energy supply of the electrodes and/or the data transmission of the evaluator station take place on different frequencies.

42. Method according to one or several of claims 37 to 41, characterized in that the channel access takes place random-oriented, preferably according to the ALOHA- or CSMA- (carrier sense multiple access) or CSMA-CD- (CSMA with collision detection) method.

43. Method according to one or several of claims 37 to 42, characterized in that the channel access takes place according to a reservation method, preferably according to the TDMA- (time division multiple access) and/or FDMA- (frequency division MA) and/or CDMA- (code division MA) and/or space multiplex method and/or priority-oriented methods.

44. Method according to one or several of claims 37 to 43,
characterized in that the HDLC-method is used for the data
transmission.

45. Method according to one or several of claims 37 to 44,
characterized in that the data transmission takes place by
means of packets, whereby the packets contain start and stop
bits and/or synchronization bits and/or useful information
and/or a test code and/or sender address and/or receiver address.